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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

MENON, KRISHNAN S

ART UNIT PAPER NUMBER

1723

DATE MAILED: 05/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

09/844,567

STRANO ET AL.

Examiner

Art Unit

Krishnan S Menon

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 04 March 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-37 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                             | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____                                    |

**DETAILED ACTION**

Claims 1-37 are pending

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1,3-6, 14-17, 22-26, and 32-36 rejected under 35 U.S.C. 102(b) as being clearly anticipated by Rao et al (US 5,104,425).

Rao (425) discloses a carbon membrane comprising a support having through pores, a carbon material attached to the pores filling a portion of the pores (instant claim 1, 32, 34) (col 8: 55-65); support pore size 0.1 to 50 microns (instant claim 3,4, 16,17, 22, 34) (col 9: 5-20); membrane pore size (instant claim 5,6, 16,17, 22-25,33-36) in the range between 0.1 nm and 100 nm (col 8: 10-18); membrane is tubular or flat disc (instant claim 14, 15) (col 9: 1-16); mesocarbon material in the pores (instant claim 16, 17, 26,34) (col 10: 37-63); and carbon attached to one surface (instant claim 32) (col 9: 4-19) with the carbon material partially filling the pores (col 10: 37-63).

2. Claims 1-8, 14-18, 21-26, and 32-37 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Foley et al (US 5,972,079).

Foley teaches a supported mesocarbon membrane comprising a porous support (col 5 lines 35-55) with mesocarbon material in the pores of the support (col 5 lines 35-55) as in claim 1. Support is stainless steel as in claim 2 (col 5 lines 35-55). Support pore size 0.1-100 microns as in claim 3,4 (col 5 lines 35-55). Mesocarbon has pore size from 1-100 nm as in claim 5,6 (col 2 lines

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58-65). Maximum operating temperature greater than 200C as in claim 8 (col 10 lines 5-35).

Membrane is tubular as in claim 14 (col 5 line 64-col 6 line 14) and flat disc as in claim 15 (fig 1,2).

Mesocarbon pore from 1-100 nm (col 2 lines 58-65) and support pores from 0.1-100 microns as in claim 16 (col 5 lines 35-55), with mesocarbon material in the support pores as in claim 17 (col 5 lines 35-55).

Regarding claim 18, Foley teaches the structure of the membrane. Claim 18 is product by process. “[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

Membrane is rigid as in claim 21 (col 5 lines 35-55), pore size distribution in the range of 1-100 nm as in c claim 22, less than 1 nm as in claim 23, 1-50 nm as in claim 24, 1-10 nm as in claim 25 (col 2 lines 58-65). Pores filled with mesocarbon as in claim 26 (col 5 lines 35-55).

Foley teaches a supported mesocarbon membrane comprising porous support with a mesocarbon material attached to at least a portion of a surface of the support as in claim 32 (col 5 lines 35-55). Support pore size is 0.1 – 100 microns as in claims 34 and mesocarbon pore size is between 1 and 100 nm as in claims 33-37 (col 5 lines 35-55; col 2 lines 58-65; see also claims 1 and 6).

Re claim 7: the membrane as taught by Foley would support a 1000 psi operating pressure, since it is of same materials of construction and have the same structure as the claimed invention. The claiming of a new use, new function or unknown property which is inherently present in the

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prior art does not necessarily make the claim patentable. *In re Best*, 562 F.2d, 1252, 1254, 195 USPQ 430, 433 (CCPA 1977).

3. Claims 27, 30 and 31 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Lafyatis et al (Ind. Eng. Chem. Res **1991**, 30, 865-873.)

Lafyatis teach a process for preparing supported mesoporous carbon membrane by applying a template polymer and a carbonizing polymer on a porous support and then pyrolyzing it as in claim 27.(page 2 and conclusions)

Lafyati teach supported carbon membrane made by depositing a carbonizing and a non-carbonizing polymer, and by controlling the pore size by the molecular weight and concentration of the template polymer as in claims 30 and 31 (page 2 and conclusions).

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

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4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 9-13, 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Foley (079) in view of Yoneyama et al (US 5,089,135).

Foley teaches a supported mesocarbon membrane as in claim 1 above. Claim 9 adds further limitation of water permeability, which is not taught by Foley. Yoneyama teaches water permeability in the range as in instant claim (see tables and fig 1) for a carbon membrane. It would be obvious to one of ordinary skill in the art at the time of invention to have the teaching of Yoneyama in the teaching of Foley to make supported carbon membrane for water permeation and liquid filtration applications. Re claims 10-13, Foley in view of Yoneyama does not specifically teach retention of BSA. However, the membrane has similar structure as claimed in the instant invention and would have similar properties. The claiming of a new use, new function or unknown property which is inherently present in the prior art does not necessarily make the claim patentable. *In re Best*, 562 F.2d, 1252, 1254, 195 USPQ 430, 433 (CCPA 1977).

Re claim 28 and 29, Foley teaches all the limitations of claim 1. Claim 28 and 29 add further limitations of a process of filtering a substance in a liquid which Foley does not teach. Yoneyama teaches filtering liquids with mesoporous carbon membranes (see col 1 lines 12-39) It would be obvious to one of ordinary skill in the art at the time of invention to use the Foley membrane for the process of filtering fluids as taught by Yoneyama for high pressure filtration applications because Foley membrane is supported and tubular (col 2 lines 40-45, col 5 lines 36-39). The Foley membrane is tubular as in claim 29 (col 12 lines 30-33).

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5. Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Foley in view of Lafyatis et al (Ind. Eng. Chem. Res **1991**, 30 (5), 865-873.)

Foley teaches all the limitations of claim 18. Claims 19 and 20 add further limitations of noncarbonizing template polymer polyethylene glycol, which Foley does not teach, in claims 19 and 20. Lafyatis teach polyethylene glycol as non-carbonizing template polymer in the ratio of 1:3 (page 866). It would be obvious to one of ordinary skill in the art at the time of invention to have polyethylene glycol as taught by Lafyati in the teaching of Foley for higher pore sizes of the mesoporous membrane as taught by Lafyati (see Conclusions of Lafyati).

### ***Response to Arguments***

Arguments submitted by the applicant re anticipatory and obviousness rejections are not persuasive.

Applicant argues that the claimed membranes are intended for ultrafiltration applications. Intended use: A claim containing a “recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus” if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987)

Applicant argues that examiner misrepresented the Rao ref and that Rao ref does not teach 1-100 nm. Well, Rao ref. teaches pores larger than 0.43 nm, and 50% smaller than 2.15 nm, which means that Rao can have pores larger than 2.15 nm. These numbers do fall within 0.1-10 nm.

Applicant’s argument about examiner’s error re Foley’s disclosure of 30-100 nm is correct; this was a typographical error. It was supposed to read 0.3 to 10 nm (see col 2 lines 54-65). However, Foley does disclose specific porosities within the range of 0.1 to 100 nm. “[W]hen, as by

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a recitation of ranges or otherwise, a claim covers several compositions, the claim is anticipated' if one of them is in the prior art." *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985) (citing *In re Petering*, 301 F.2d 676, 682, 133 USPQ 275, 280 (CCPA 1962))

Applicant's argument re obviousness rejections: Applicant argues that Foley is directed to membranes suitable for small molecule separations and Lafyati et al directs to mesoporous and microporous structures, and that there is no motivation to combine these references. Examiner disagrees. Both references teach similar membranes – carbonaceous membranes. Lafyati teaches how to control the pore sizes in a membrane like that of Foley's PFA derived CMS membranes by using a template polymer like PEG to obtain larger pore diameters. One of skill in the art would combine the teaching together to tailor the membrane for different applications like ultrafiltration or microfiltration. The argument that larger pores would make Foley membrane ineffective has no basis; in fact, changing the pore size would make the membrane applicable for separation from one set of fluids to a different set of fluids. Again, application is only intended use; what is claimed is the product (membrane).

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Krishnan S Menon whose telephone number is 703-305-5999. The examiner can normally be reached on 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wanda L Walker can be reached on 703-308-0457. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.



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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Krishnan Menon  
Patent Examiner  
April 26, 2003

  
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